INTERMOUNTAIN STATION
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MAY 13 1936
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INTERMOUNTAIN

APPLIED FORESTRY NOTES

NORTHERN ROCKY MOUNTAIN
FOREST AND RANGE EXPERIMENT STATION

No. 75 Missoula, Montana May 15, 1936

What Percent of Tree Volume Is in Each Log of a Western White Pine Tree ?

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Of especial interest to timber cruisers are the following figures which show for western white pine trees, the percent of gross volume contained in the butt log, second log, and other logs, including the top log. The measurements on which the table is based were taken near Orofino, Clearwater County, Idaho, in a stand of western white pine timber approximately 140 years of age.

Percent of merchantable volume represented by butt log, second log, etc. for western white pine trees.
(Basis of volume: Scribner Dec. C. log rule)

Log position in tree	Number of 16-foot logs per tree						
	2	3	4	5	6	7	8
	(percent of gross merchantable volume)						
Butt	55	43	35	31	27	25	25
2	--	33	28	25	23	21	20
3	--	--	21	20	19	18	17
4	--	--	--	15	15	14	14
5	--	--	--	--	10	11	10
6	--	--	--	--	--	7	7
7	--	--	--	--	--	--	4
Top	45	24	16	9	6	4	3
Gross merch. volume	100	100	100	100	100	100	100

Based on 641 trees, 10 to 35 inches in diameter, from White Pine Lumber Company study plot.

The term "gross merchantable volume" as used in the table refers to the volume of wood between the stump and end of the last utilized log. It includes utilized logs and also all waste material such as breakage, cull logs, and defect within utilized logs.

The figures apply to all diameters of tree from 10 to 35 inches. The height of tree, expressed in terms of 16-foot logs, influences the percent of volume in different logs but diameter has little effect. A 3-log tree 16 inches in diameter at breast height has about the same percent of volume in the butt log as a 3-log tree which is 20 inches in diameter.

There are numerous applications of the figures in the above table. For example, they will help to answer a question like the following for a timber cruiser: If 1/5 of the butt logs on a given area are culled, what percent of total volume do they represent? Assume that the timber is 5 logs high: then by referring to the table, the percent of total volume represented by the butt log of a 5-log tree is found to be 31 percent. If 1/5 by number are culled, the percent of defect becomes 1/5 of 31 percent or 6.2 percent.

Take another example: in a stand of 6-log timber, it is found that the butt and second log are of clear quality, the next two logs are medium quality, and the last two logs are rough. What percent of total volume does each quality class represent? Referring to the 6-log column of the table, the percent by volume of clear logs amounts to 50 percent (27+23), the percent of medium quality logs, 34 percent (19+15), and the percent of rough logs, 16 percent (10+6).